

AMENDMENTS TO THE CLAIMS

WE CLAIMS (clean copy)

1. (currently amended) A system for operating a plurality of electronic variable
5 optical attenuators (eVOAs) controlled by a microcontroller, the system
comprising:
 (a) Means for selecting one eVOA from the plurality of the eVOAs at a time;
 (b) means for operating the selected eVOA according to a predetermined
method of controlling the selected eVOA within a time slice allocated for the selected
10 eVOA;
 (c) means for repeating the steps (a) to (b) until all eVOAs from the plurality of
the eVOAs have been selected; and
 (d) means for repeating the steps (a) to (c) as required.
- 15 2. (original) A system as described in claim 1, wherein the means for
selecting and operating further comprises:
 a scheduler having a clock for generating the allocated time slice $\{ \tau \}$
for monitoring and controlling the selected eVOA;
 a processor for calculating the attenuation of the selected eVOA
20 according to the predetermined method of controlling the selected eVOA
during the allocated time slice;
 a monitor signal processing controller for measuring power of an optical
signal at the selected eVOA;
 a microprocessing controller for changing an operating attenuation of
25 the selected eVOA in response to a signal received from the processor; and
 a means for providing communications between the processor, the
monitor signal processing controller, the scheduler and the microprocessing
controller.
- 30 3. (original) A system as described in claim 2, wherein the monitor signal
processing controller for measuring power of an optical signal at the selected
eVOA comprises one of the following:
 a means for measuring the optical signal power at an input to an eVOA;

a means for measuring the optical signal power at an output of an eVOA; and
a means for measuring the optical signal power at an input to an eVOA and at
an output of an eVOA.

- 5 4. (original) A system as described in claim 2, wherein the scheduler
 comprises a means for electronically cycling and scanning the plurality of eVOAs
 within a response time "T" of the microcontroller, wherein $T = n \cdot \tau$, "n" is the
 number of eVOAs, and τ is the time slice for actively monitoring and controlling
 each eVOA.
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5. (original) A system as described in claim 2, wherein the microprocessing
 controller comprises a means for determining a required attenuation level and a
 means for setting the eVOA at said attenuation level.
- 15 6. (original) A system as described in claim 5, wherein the microprocessing
 controller further comprises means for adjusting and updating attenuation of the
 selected eVOA.
7. (original) A optical system for an optical network comprising the system
20 for operating the plurality of eVOAs as described in claim 1.
8. (currently amended) A method for operating a plurality of eVOAs controlled
 by a microcontroller, comprising the steps of:
- 25 (a) selecting an eVOA from the plurality of eVOAs;
 (b) operating the selected eVOA according to a predetermined method of
 controlling said eVOA within a time slice allocated for the selected eVOA;
 and
 (c) repeating the steps (a) to (b) until all eVOAs from the plurality of the
 eVOAs have been selected; and
30 (d) repeating the steps (a) to (c) as required.

9. (original) A method as described in claim 8, wherein the step of selecting the eVOA from the plurality of eVOAs comprises continuously cycling through the eVOAs.

5 10. (original) A method as described in claim 9, wherein the step of cycling comprises one of the following:

cycling through the eVOA in a prescribed order; and
cycling through the eVOAs in a random order.

10 11. (original) A method as described in claim 9, wherein the step of operating the selected eVOA comprises measuring an optical signal power of the optical signal at the selected eVOA.

12. (original) A method as described in claim 11, wherein the step of measuring the
15 optical signal power {P_{meas}} at the selected eVOA comprises one of the following:

measuring the optical signal power at an input to the selected eVOA;
measuring the optical signal power at an output of the selected eVOA; and
measuring the optical signal power at an input to the selected eVOA and at
20 an output of the selected eVOA.

13. (original) A method as described in claim 11, wherein the step of operating the selected eVOA comprises:

25 setting attenuation of the selected eVOA to a pre-determined fixed value, which is less than a minimum attenuation for the selected eVOA, if a loss-of-signal (LOS) power condition is detected for the selected eVOA;

setting said eVOA attenuation to a pre-determined fixed value, which is less than said minimum attenuation, if the measured power {P_{meas}} is greater than a target power {P_{target}} for the selected eVOA; and

30 setting attenuation of the selected eVOA to a pre-determined fixed value, which is less than said minimum attenuation, if the measured power {P_{meas}} is less than the target power {P_{target}} for the selected eVOA.

14. (original) A method as described in claim 9, wherein the step of continuously cycling through the eVOAs comprises the step of scanning the plurality of eVOAs in a specified time period "T", wherein $T = n \cdot \tau$, "n" is the number of eVOAs, and τ is the time slice for controlling each eVOA.

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15. (original) A method as described in claim 11, wherein the step of operating the selected eVOA comprises changing the attenuation of said eVOA in one or more variable size intervals (VSI) so that the power of the optical signal substantially equals to the target power {Ptarget}, the size of the variable interval being a function of the {Pmeas} and {Ptarget}, if the measured optical signal power {Pmeas} differs from a target power {Ptarget} for the selected eVOA.

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16. (original) A method as described in claim 15, wherein the step of changing the attenuation of said eVOA in one or more variable size intervals (VSI) comprises changing the attenuation of said eVOA in intervals, whose size in a linear function of the {Pmeas} and {Ptarget}.

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17. (original) A method as described in claim 15, wherein the step of changing the attenuation of said eVOA in one or more variable size intervals (VSI) comprises changing the attenuation of said eVOA in intervals, whose size in a non-linear function of the {Pmeas} and {Ptarget}.

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18. (original) A method as described in 11, wherein the step of operating the selected eVOA comprises:

25 measuring the optical signal power at the output of the selected eVOA; and
if the optical signal power is below a loss of signal (LOS) power threshold,
setting the attenuation of the selected eVOA to a maximum attenuation
(MaxAtt) and modulating the attenuation said eVOA by decreasing and
increasing the eVOA attenuation in finite steps until the optical power is
30 detected above the LOS power threshold or the maximum attenuation (MaxAtt)
is reached.

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19. (original) A method as described in claim 18, wherein the step of selecting the eVOA comprises continuously cycling through the eVOA in a specified time period " τ ", wherein $T = n \cdot \tau$, " n " is the number of eVOAs, τ is the time slice for controlling each eVOA; and further comprises taking time " T_s " for each finite step
5 such that $S \cdot T_s < T$, wherein " S " is the maximum number of finite steps.
20. (original) A method as described in claim 19, wherein the step of modulating the eVOA attenuation in finite steps comprises determining a maximum number of steps " S " for decreasing and increasing the attenuation, an attenuation value per
10 step " A_s ", and a predefined protection attenuation (PPA).
21. (original) A method as described in claim 20, wherein the step of modulating the eVOA attenuation in finite steps further comprises:
selecting a stepping down step size for decreasing the eVOA attenuation by A_s such
15 that $\{\text{MaxAtt} - \text{PPA}\} < S \cdot A_s$; and
selecting a stepping up step size for increasing the eVOA attenuation by A_s such
that $\{S \cdot A_s + \text{PPA}\} < \text{MaxAtt}$.